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design neatly on to the vase and with a sharp knife or scraper, sold for the purpose, take off the ground within the lines of the design as cleanly as possible, then grind up the egg yellow and bronze green separately with a little turpentine; add to each some fat oil, and paint in the flowers yellow and the leaves with the bronze green, leaving the light streaks in the centre to be filled in with gold later on. Lay the color in as flat as possible; re-touch where necessary when the first painting is dry. When this is done and the tint is again allowed to dry, make a raised outline to the entire design; also raise the stalks and centres of the flowers with gold paste mixed with turpentine and fat oil. It requires some skill to keep the line of the same thickness throughout. Next, before the first firing, lay on a coat of matt gold over the vase neck and rim only. It is best to buy the gold prepared on glass slabs, so that it only needs to be ground with turpentine until of a creamy consistency. Lay the gold on smoothly and sufficiently thick to hide the china beneath. Let this stand for about twenty-four hours, and the vase is ready for the kiln. After the first firing repaint the flowers and leaves if not sufficiently opaque; but take care not to let the paint run over any part of the paste which is now ready for covering with gold. Paint on the gold with a small brush. Also put in the centres of the leaves with a flat line of gold; this must on no account be done before the first firing. It will be well to give the neck and base another smooth coating of gold to enrich it. After the second firing, burnish the gold with a glass burnisher; it will probably be necessary to use an agate for the centres of the leaves, also for the outline, if it is desired that it shall be very bright.

These directions will be quite sufficient for those who have followed the instructions for Royal Worcester work given in recent numbers of *The Art Amateur*. "A Lesson in Royal Worcester Decoration," published last December, will, especially, be found valuable for those who have not yet attempted this now popular genre of china painting. Several other designs for this kind of decoration are in hand, and will appear from time to time.

Amateur Photographer.

PHOTOGRAPHY FOR BEGINNERS.

I.—EMULSION PHOTOGRAPHY.

THIS series being written for those who are entirely unacquainted with photography, it has been thought best to begin it with a chapter on emulsion photography.

The sensitive film which is spread on glass, paper, or celluloid, is usually bromide, chloride, or iodide of silver in connection with some suitable vehicle, such as albumen, collodion, or gelatine. The chlorides, bromides and iodides being known in chemistry as halogens, that is, substances which in combination with a metal produce saline compounds, these salts of silver are sometimes spoken of as the haloid salts of silver.

The vehicle or substance first used to hold the haloid salt in suspension was albumen, and the sensitive film was produced by adding to it small quantities of a bromide or an iodide, such as potassic or ammoniac bromide or iodide; this was then spread thinly on glass and allowed to dry, when it was sensitised by immersion in a solution of silver nitrate; during the immersion the nitrate combined with the bromide or iodide, thus forming a haloid salt sensitive to light.

The process remained practically the same when collodion took the place of albumen owing to certain advantages possessed by it.

From the fact that plates thus prepared required to be used while still wet, this process was known as the wet plate process.

In order to remove the objectionable features of the wet process, experiments were early made to form the sensitive salt by itself, and then to mix it with albumen or collodion to form an emulsion which could be poured over the glass plate and used dry. These experiments were successful, and the new method of working was called emulsion photography.

It will be seen, therefore, that a photographic emulsion is simply a solution of albumen, collodion, or gelatine containing a haloid salt of silver, usually the bromide. The expressions "collodion emulsion," "gelatine emulsion," indicate nothing more than the substance with which the sensitive salt is combined or mixed.

Albumen emulsion, owing to its great slowness, is now

no longer used save in exceptional cases where excessive fineness of grain or deposit is required.

Collodion emulsion possesses some advantages over gelatine since it can be prepared more easily, is always ready for use to coat a few plates and the films set and dry more rapidly than gelatine films. But collodion films are neither so hard nor so rapid as gelatine films, and they will not keep good for so long a time. For these reasons our modern dry plates are coated with a gelatine emulsion.

Sensitive emulsions may be applied to paper and celluloid as readily as to glass. The most common use to which paper so coated is put is the production of positive prints either by exposure or by development. The well-known bromide, chloride, aristotype and transferotype papers are of this class. Paper coated with an emulsion is also used for making negatives, and the recently introduced ivory and flexible films are sheets of transparent celluloid coated with an emulsion.

II.—THE CAMERA.

The camera is nothing more than a mechanical contrivance to facilitate the exposure of the plate to the reflected rays of light passing through the lens, while protecting it from all other rays which would only injure it.

As it is necessary that some provision shall be made for securing sharpness of lines on the ground glass or focussing screen, most modern cameras are provided with some means of varying the distance between the ground glass and the lens. In the best forms this motion is imparted by means of a rack and pinion. Usually also the board on which the lens is mounted is capable of a vertical motion, and the ground glass frame is so mounted as to allow its top or bottom to swing out from the camera body. The purpose of these useful adjuncts will be described later on.

If possible the beginner should purchase a camera with a sliding front and a swing back. They add but little to the cost and they greatly increase the efficiency of the instrument.

The camera should always be provided with some means by which it may be easily and readily reversed, according as a horizontal or a vertical use of the plate will produce the best result with a particular view. The best method of effecting this without adding unduly to the cost and weight is to have the camera square, thus allowing the frame in which the plate-holder is placed to be reversed at will.

It is hardly necessary to say that an instrument whose sole purpose is to keep out all needless light should be absolutely light-tight. This should be most carefully looked after.

Good serviceable cameras fulfilling all these requirements can be bought at reasonable prices, and none others should be purchased.

It is not possible to give any specific advice as to the size best adapted to the wants of the beginner. The question of expense and of the cost of working largely determines the matter. The smaller sizes have the advantage of smaller cost, lower working expenses, greater ease of manipulation and lighter weight; while the larger sizes are better adapted to more serious work. The whole plate camera—that is, one which uses the $6\frac{1}{2} \times 8\frac{1}{2}$ plate—seems large enough for the beginner, while the small $3\frac{1}{2} \times 4\frac{1}{2}$ size will not be too small to produce good work. Intermediate between these are a number of other sizes which are much used, the 5×8 being, perhaps, the most popular.

The tripod is an important accessory to the camera, which must be firmly mounted to prevent vibration during exposure. The legs should be stout enough to be firm and rigid when set up, and they should slide or fold for convenience of transportation. The tripod head should be broad enough to afford a good base for the camera when screwed in position.

Plate-holders are necessary to protect the plates from light before and after exposure. They are usually made of wood, and double, to hold two plates. They are provided with slides which draw out when the plate is to be exposed. The holders must be absolutely light-tight and fit the camera-back accurately. Their usefulness will be prolonged if they are carried in a bag of black cloth to protect them from the sun.

A focussing cloth of velvet, rubber, or other opaque material, large enough to go completely around the camera, a focussing glass, a small spirit level and a note book will complete the field outfit, with the exception of the lenses, which will be considered in the next chapter.

W. H. B.

THE PHOTO-ZINC AND PHOTO-ENGRAVING PROCESSES.

IV.—STEREOTYPES AND ELECTROTYPES.

ADVANTAGE has been taken of the peculiar effect of light upon a bichromated gelatine film for the rapid and economical production of electrotypes and stereotypes from a high relief gelatine film without the intervention of any etching process whatever. When films of bichromated gelatine are exposed to light under a photographic negative and then immersed in cold water, the parts not affected by light will absorb water and swell; hot water will entirely dissolve them. In either case a high relief will be formed. In the former case the parts protected from the action of the light by the blacks of the negative will swell and form the relief. In the latter case the undissolved portions of the film—that is, the lines, will form the relief by the dissolving of the other parts of the film. This process is technically known as the "Wash-Out" process, while the former is called the "Swelled Gelatine" process.

The negatives for these, as for most other photo-engraving or printing processes, must be of that intense kind known as "black and white" negatives; full directions for making these negatives were given last month.

Only line drawings, engravings, wood-cuts, etc., can be directly reproduced by these processes without the adoption of some means of breaking up continuous gradations into dots or lines. Half-tone drawings, water-colors, oil-paintings, etc., may be prepared for the printing press by the introduction of a suitable system of lines or stipple as described in a former article.

For the "Wash-Out" process the negative must be made reversed, or have its film stripped from its support and turned. Full directions for these operations have already been given.

The sensitive films are made by first swelling three and a quarter ounces of any good soft gelatine (Coignet's or Nelson's) in sixteen ounces of cold water. When the gelatine is well swollen it is poured out into a porcelain dish and kept at a temperature varying between 100 and 120 degrees Fahrenheit for forty-eight hours, being repeatedly stirred to prevent the formation of a scum on the surface. It is well also to agitate the dish occasionally.

As soon as the decomposition of the gelatine is effected, six and a half drams of white sugar, two and a half drams of glycerine and seventy-five drops of ammonia are added, the mixture having been previously colored with sufficient finely powdered lamp-black, as not to destroy completely the transparency of a glass plate coated with it. Two drams of powdered bichromate of potash dissolved in the smallest possible quantity of water are then added and the solution thoroughly stirred. The mixture is next filtered several times through fine linen, removed to the dark room or drying closet, and kept at a temperature of about 135 degrees for twenty minutes.

In order to prevent the films sticking to the plates the latter are rubbed over with an oiled rag.

To secure an even coating and films of equal thickness, the plates are accurately levelled and a measured quantity of the mixture poured upon each plate.

Just previous to coating the gelatine is filtered into a beaker glass. All the vessels used, as well as the glass plates, should be warmed to about blood heat to prevent the setting of the gelatine before an even film is secured. The temperature of the coating room should be about 70 degrees, and it should be lighted only by yellow or weak daylight.

All scum and air bells are removed from the surface of the filtered emulsion with a piece of cardboard. The levelled plates are easily coated by pouring sufficient of the mixture to give a moderately thick film over the surface of each plate, using a glass rod or the tip of the finger to bring the coating up to the corners and edges of the plates. As soon as the films are firmly set they may be removed to the drying box to dry, or they may be allowed to dry in the coating room if it is efficiently ventilated and can be closed against all entrance of white light. Under the best conditions of ventilation the drying is necessarily slow, although in large establishments it is hastened by the use of rotary fans driven by machinery. The film must on no account be stripped from the glass until it is perfectly dry, or it will be pulled out of shape and shrivel up during the washing. When the film is perfectly dry it is cut around close to the edge, one corner is started, and the film is gradually pulled

from the glass. It is then placed in the printing frame with the glossy side in close contact with the negative. Under "black and white" negatives, which vary but little in density, the proper exposure is about fifteen minutes in the sun, longer of course in the shade or on cloudy days. Great importance attaches to the exposure. If it was too brief the finer lines and details will be washed away; and if too prolonged the delicate parts will be indistinct and there will be a want of sharpness.

The exposed film is developed in the dark room with a brush dipped in a can of warm water and rubbed over the film, flowing water over the film after each application of the brush. As soon as all the soluble portions of the gelatine are dissolved the film is immersed in alcohol for fifteen minutes to absorb the water and straighten the lines. It is then well washed and squeezed into perfect contact with a shellacked zinc plate. When dry it is inked up and a proof taken. If the proof is satisfactory the plate is electrolyzed.

The Swelled Gelatine process. When only unreversed negatives are used, the Swelled Gelatine process must be employed, but two casts must then be made. The only difference between the two methods is in the treatment of the film after exposure. The same sensitive solution is used in both processes and the operations of coating and drying are the same in each. In order to secure absolute and perfect contact between the film and the negative, printing frames specially constructed for this class of work must be used. They differ from the usual frame only in having a stronger and more efficient system of springs, by means of which a greater and more evenly distributed pressure is secured.

Twenty minutes' exposure to sunlight under a good process negative will be sufficient. After exposure the plate is placed in the tray and sufficient cold water is poured in to cover the film. The water must be changed several times in order to remove the chromium salt, and the swelling process is allowed to continue until the tops of the swelled lines are parallel with the surface of the plate—that is, straight across, neither convex nor concave. A little practice will enable the beginner to determine the proper time for swelling.

After swelling, the plate is washed and hardened in a one to fifty solution of chrome alum in water. It is then rinsed and laid down upon a smooth stone slab previously oiled. The casting irons, well oiled, are laid around the plate and filled with casting plaster. Paraffine or wax may be used to make the cast, but the following plaster gives a more stable cast. Sufficient of casting plaster to fill the "clumps" is mixed to a thick paste with water and a pinch of borax or salt is added. The casting irons, which must be type high, are filled with this composition, all the parts being well filled. A brass-edged bar is used to bring the top of the cast down even with the top of the casting irons or "clumps." When the plaster is perfectly set, and not before, the "clumps" are removed and the cast taken from the gelatine plate. From this intaglio cast a high relief cast is made as described above. When the relief cast is set it may be removed from the intaglio cast by inserting a wide-bladed knife between the two and gently forcing them apart. From the relief cast a stereotype or an electrotype is easily made in the usual manner.

As the swelled gelatine process does not allow of any great depth of line, the stereotype or electrotype will need to be worked over by hand, the high lights being cut deeper and the wide and open spaces being routed out on the machine or by hand. The plate is then mounted on a wood block and sent to the press. W. H. B.

ARTISTIC BLUE PRINTS.

BLUE printing is a favorite process with many amateurs on account of its simplicity and certainty. A first-rate blue print has a beauty and charm which make it very attractive, but high grade blue prints are by no means common. The negatives do not always possess the necessary pluck, and the ready sensitized paper of commerce leaves much to be desired.

Some time ago I stumbled upon a method which with proper negatives yields results vastly superior to any

that I have hitherto been able to obtain, besides doing away with the bother of mounting the prints on cards.

The foundation of the process is a good quality of cardboard well sized, but not glazed; it is about the weight of three-sheet Bristol, but is not so expensive. The board is cut sufficiently larger than the negative to leave a good, liberal margin. I use 8x10 sheets for 6½x8½ negatives. The sheets are sensitized with equal parts of the following solutions, mixed just before using:

Red prussiate of potash.....	50 grains.
Water.....	1 ounce.
Citrate of iron and ammonia.....	100 grains.
Water.....	1 ounce.

The sensitizing is best done by means of a Bucklin brush, which is nothing more than a piece of soft white flannel, folded over once or twice, and tied over the end of a strip of glass three or four inches wide. This is dipped in the solution, drawn across the edge of the dish once or twice to remove all excess of solution, and brushed over the card in all directions to secure an even coating of a golden hue.

The next step is to cut from thin black paper a number of masks of the same size as the prepared board, and having central openings somewhat smaller than the negatives. These openings may be of any desired shape, and it is well to have two for each printing-frame. Their object is to protect the margins of the boards from the action of light, that they may wash out clean and white.

A sheet of clean white glass is placed in the frame, over this one of the masks, and then the negative is arranged in the desired position and covered with a second mask. The prepared board is then laid on the negative, the back of the frame closed, and the printing done as usual.

The printing must be quite deep, as very much is washed out.

The best way to wash the printed sheets is to use a rose tap carrying warm water until nearly all the soluble matter is removed, and then to wash for an hour in running water.

The final result will be a print of a beautiful rich blue, showing nearly as much detail as a good silver print, and with a broad white margin. If desired a plate mark may be put in before the prints are quite dry. This adds greatly to the appearance of the prints and is easily done.

A sheet of hard cardboard is cut sufficiently larger than the printed picture to allow a half inch margin all around. A piece of glass of the same size and a copying-press or other effective means of securing a good pressure complete the outfit.

The glass plate is laid down over the picture and moved about until the picture is accurately centred; two or three light pencil marks are made on the edges, the glass removed and the cardboard substituted, the pencil marks serving as guides. The two are then placed in a folded sheet of white paper and placed in the copying-press and a good pressure applied. In a few moments the cards may be removed, when a distinct impression of the plate card will be found sunk into the board. The corners of the plate card should be slightly rounded off.

If any of the readers of The Art Amateur wish to try this process and are unable to procure suitable board, I shall be pleased to supply them with the kind I use, together with sample prints. W. H. BURBANK.

A DISCUSSION OF THE DETECTIVE CAMERA.

IN a recent number of The Art Amateur we gave an account of the interesting exhibition of artistic photographic work by members of the New York Society of Amateur Photographers. A discussion of the so-called detective camera, held at the rooms of the society, 122 West Thirty-sixth Street, brought out the opinions of a great many amateurs concerning that instrument, and a report of the conclusions generally arrived at will, we are sure, prove acceptable to many of our readers. In the first place, we should, perhaps, state what the detective camera, or "artist's camera," as its inventor would prefer that it should be called, is. Essentially, it consists,

like all other cameras, of a dark box, with a lens and shutter at one end, and a sensitized plate at the other, at the proper focal distance from the lens. Add what is called a "finder," to be described presently, and some simple means of instantaneously dropping the shutter, and you have all the necessary elements of a detective camera. Any one can, of course, build one for himself, buying a good lens, a plate-holder and a supply of the *most sensitive* plates from a dealer. This last point is of the greatest importance, for the camera must do its work instantaneously, not only because it is intended more particularly for subjects and effects that will not stay, but also because, being carried in the hand or supported on the arm, it cannot have the steadiness necessary to prevent blurring during a long exposure. For the same reason, the drop shutter must work instantaneously. In the simpler forms of the instrument, it is a piece of blackened tin, or other metal, fixed on a pivot on the inside of the box, so as, when dropped, to completely cover the lens and prevent the passage of light through it. It is generally arranged to be raised by means of a small lever, which may be one with the shutter itself (cut out of the one piece of tin or brass), projecting through a slot in the cover of the box, a small ratchet or other catch to keep it in place and a string or knob working a spring to displace the catch and allow the shutter to drop instantaneously. The exposure, regulated by raising the shutter and dropping it again, should be very short; there are some automatic devices for determining it; but as a great deal depends on the judgment of the operator, an ordinary amateur had better do without them. The "finder," already mentioned, is a small plate of ground glass fixed in some part of the box easily examined, usually in the top, near the front, and covered when not in use by a flap of the leather handle used to carry the box. A very small lens in front, just above the working lens, throws, by means of a reflector, an image of the object on the finder, and thus one is enabled, without lifting the camera to the eye, to be sure that it is properly pointed. Nevertheless, the usual ground glass plate and spy-hole at the back of the camera are generally provided; for the finder does not enable one to see whether the instrument is properly focussed. Commonly, there are two finders, one at top and the other on one of the sides of the box, because the plates used being oblong, by turning the box on its side one may obtain a horizontally longer view, while by holding it right side up, so to speak, one gets a view which takes in more of the perpendicular. With a common cigar box fitted with lens, finder and slot for plate-holder and ground glass very good work may be done; but most of the cameras manufactured contain in addition the usual "bellows" for regulating the focus, and the box is lengthened to contain from half a dozen to a dozen plates. A small camera with fixed focus and a sensitive film roll instead of plates is also manufactured; but it only occasionally gives good results, and its pictures are too small to be of much use to an artist.

Of the fifty or more communications read by our secretary at the meeting of the society on January 8th, the greater number referred to the desirability of improving the arrangements for using the roll of sensitized film, or a number of films, so as to do away with the need of carrying a bulky and cumbersome quantity of plates. Some improved method of withdrawing and changing plates was also held to be a desideratum. It was generally agreed that the cameras, as made, were not deceptive in appearance, and therefore were not useful, for what may fairly be called detective work, such as taking a human subject unawares. It was thought, by one writer, that the machine might best be given the form of a satchel. The best way to hold it, however, was decided to be under the arm—rather an awkward way of holding a satchel. It was considered by some that some trustworthy automatic means of regulating the speed of the shutter would be a boon. Finally, large lenses and correspondingly large finders were almost unanimously held to be absolutely necessary to bring the instrument up to its fullest capacity. It seemed to result from the discussion that the simplest form of the instrument as described above, if fitted with a good large lens, was the best for artistic purposes.

